

Collin DeVore

CBA Report

In 2019 two researchers named Brad Wong and Mark Radin wrote a paper entitled *Benefit – Cost Analysis of a Package of Early Childhood Interventions to Improve Nutrition in Haiti*. The cost – benefit analysis was written from the perspective of a Haitian policymaker, so that they would be better able to utilize their limited resources more efficiently by knowing the effects that packages such as this can have. As such, this paper uses United States’ dollars and Haitian gourdes in order to show the overall costs and benefits of implementing the package. For the purposes of this report, only the Haitian gourde values will be considered when possible. The policies included in this package include iodizing salt, supplements for pregnant women (including calcium, protein, and micronutrients), supplements for children (including vitamin A, zinc, and food supplements), the promotion of breastfeeding for women with children under the age of six months, teaching women about when their children switch to food, and help for children suffering from severe acute malnutrition, each of which were estimated for their costs and benefits had they been implemented from 2016 to 2025. Altogether, this package contains ten different “interventions” to be analyzed in a single analysis. These interventions are taken from another study in which the authors recommend using them to improve the lives of people in middle- and low-income countries (Bhutta et al. 2003). Radin and Wong took this study and adjusted the findings in order to better understand if the project could be used to improve the health of Haitians. The costs and benefits for this package have been adjusted by a program called LiST (Lives Saving Tool) to target ninety percent of Haiti, and the amount of people affected in cited studies were adjusted to reflect this change. Three discount factors are used in this analysis in order to coincide with numbers given from previous studies. The discount factors chosen are three percent, five percent, and twelve percent. The authors explain that the purpose of the analysis is only to examine if this package is worth the cost, and so other

packages or ideas are not compared with this one, nor do the authors reorganize the package to fit their own standards.

The analysis begins by discussing the costs for the package. Each of the costs for the package are taken from findings by a Haitian group of researchers that met together to understand how to improve the Haitian population's health, calling their work and meetings *Haiti Priorise*. Both the initial costs of implementation and the costs of maintenance for each subsequent year are calculated. The cost for the micronutrient and calcium supplementation for the pregnant women, including labor and transportation costs, are taken from a previous study and restructured to reflect the fact that transportation costs will increase as the number of women in need of the supplementation decreases. The costs for these two interventions are therefore estimated at 3,200 gourdes per woman and 746 million gourdes each year after, to cover ninety percent of the population. The cost of vitamin A supplementation for six to fifty-nine-month-old children are taken from previous studies and rescaled to estimate a cost of 250 gourdes for each child and 39 million gourdes for each subsequent year. The cost of iodizing the salt is taken directly from previous literature, which is estimated at 2 gourdes per case and 0.5 million gourdes each year. The severe acute malnutrition help for six to twenty – three month old children, which is given as needed, is calculated from previous literature to cost 165 gourdes per case and 4.3 million gourdes each year thereafter. The last five interventions are estimated based on their relation to the cost of micronutrient and calcium supplementation for pregnant women and the cost of micronutrient and vitamin A supplementation for children. Though not always explicitly calculated in the article, the values given are 3,195 gourdes for protein supplements for pregnant women (745 million gourdes each year after), 518 gourdes for zinc supplements for twelve to fifty – nine month old children (121 million gourdes each year after), 1,830 gourdes for the promotion of breastfeeding (253 million gourdes each year after), 673 gourdes for teaching women about feeding their six to twenty – three month old children (106 million gourdes each year after), and 6,390 gourdes for food for six to twenty three month

old children (1,005 million gourdes each year after). Altogether, the implementation of this package will cost 3,182 million gourdes at a three percent discount rate, 3,178 million gourdes at a five percent discount rate, and 3,166 million gourdes at a twelve percent discount rate, including the cost of workers and travel.

After the total cost of the package is implemented, the benefits of the package are calculated. To do this, the value of a statistical life and three variations are calculated so that the value placed on the life of the children and the value placed on the life of the mother can be estimated. The three social discount factors are then used to estimate the value placed on the individual that otherwise would have died in each of the ten years. For the first calculation, which the authors call the “base case”, the value is given as 1.3 million gourdes, which is 3,129 million gourdes at a 3% discount rate, 3,101 million gourdes at a 5% discount rate and 3,009 million gourdes at a 12% discount rate. The second calculation of the value of a statistical life year at 36,000 gourdes gives 5,802 million gourdes at a 3% discount rate, 5,747 million gourdes at a 5% discount rate, and 5,566 million gourdes at a 12% discount rate. The third calculation of the value of a statistical life of 4.5 million gourdes gives 9,493 million gourdes at a 3% discount rate, 9,459 million gourdes at a 5% discount rate, and 9,348 million gourdes at a 12% discount rate. The final calculation of 7.2 million gourdes gives 15,189 million gourdes at a 3% discount rate, 15,135 million gourdes at a 5% discount rate, and 14,957 million gourdes at a 12% discount rate. In terms of calculating the final benefit, only the “base case” is considered by the authors.

The value gained from this package by people that would not have died but would have had health issues is estimated from a study in China that looked at the willingness to pay of citizens to avoid diarrhea. This study was adjusted to estimate the values that Haiti would be willing to pay and used as an overall estimate of the benefits gained from the package that involved health issues, but not death. This calculation gave a benefit of 709 million gourdes for a 3% discount rate, 707 million gourdes for a 5% discount rate, and 700 million gourdes for a 12% discount rate. Another estimation is used in order

to measure the accuracy of the first estimate, though it is not used in performing the final net benefit of the analysis. For this estimation, the value of a statistical life per year is used, along with the cost of doctoral or other such medical personnel whether in a hospital or not and the opportunity cost that the medical personnel in question would otherwise forego. This gives a total benefit of 317 million gourdes for a 3% discount rate, 316 million gourdes for a 5% discount rate, and 311 million gourdes at a 12% discount rate. Lastly, the amount of work that the affected Haitians would have foregone is calculated as the last benefit in the study. In order to calculate the amount that otherwise would have been earned, the authors find a study in which an intervention to combat child malnutrition was implemented in Guatemala to male children and the result was a 46% increase in the average amount of wages paid in later life. The authors make multiple assumptions here, stating that they assume the gross national income will continue growing constantly and consistently and that the 46% increase will stay constant from age 16 to age 60. The article then estimates that the amount of wages otherwise foregone would amount to 23,025 million gourdes for a 3% discount rate, 12,743 million gourdes for a 5% discount rate, and 2,525 million gourdes for a 12% discount rate.

After the amount of wages that would have otherwise been foregone is calculated, the benefits are aggregated. The amount of benefits for a 3% discount are 26,593 million gourdes, for a 5% discount are 16,294 million gourdes, and for a 12% discount are 6,019 million gourdes. Taken together with the costs, this creates a net benefit of 23,680 million gourdes with a 3% discount rate, 13,372 million gourdes with a 5% discount rate, and 3,068 million gourdes with a 12% discount rate. Since all these values are positive, this suggests that the benefits for the package are greater than the costs, and, as such, the package can be implemented.

This analysis has many strengths associated with it. To begin with, after the initial analysis is performed, 10,000 Monte Carlo simulations are run with the alternative lowest values and the highest values from the previous unused calculations on a uniform distribution, with the amount of people

helped by the interventions run on a normal distribution. A short – term growth rate of around 5%, medium term growth rate of 3%, and a long – term growth rate of 1.2% along with a discount rate with a minimum of 0% and a maximum of 10% is set into the estimates. Each of these values is given by previous literature. The simulations give a low value of 1.3 million gourdes, an average value of 8.6 million gourdes, and a high value of 44.6 million gourdes. The fact that all 10,000 simulations are above a benefit of 0 lends vast credibility to the study, since the benefits outweigh the costs in different variations of the analysis, assuming the distributions, the maximum values, and the minimum values are all correct. These simulations work as though the analysis is performed 10,000 times under different assumptions, and each of these suggest that the package is worth the cost. Another strength stems from the fact that, not only were the costs calculated using the actual costs of the interventions and the labor and travel costs, but the travel costs used previously were changed so that the cost of travel increases as more people are reached. Since this will likely be a large issue when implementing the project, the fact that it is factored into the calculations is a large source of strength that gives credibility to the study.

The weaknesses found within this study include the idea that the author does not seem to consider the possibility of people rejecting the interventions in favor of their more traditional or easier methods. Two of the interventions, for instance, attempt to show Haitian mothers how to use their resources more effectively and in a healthier manner through education. This factors in psychological issues and possibly localized effects such as the effect of negative peer pressure or cultural issues that may influence some not to take the supplements or make use of the teaching. Though it is hard to tell if this was taken into consideration, since the authors rely heavily on other articles, software, and calculations, it is probable that there are few localized effects that are taken into account, so the costs to reach 90% of the population of Haiti may be an underestimate, or may not be attainable. The LIST program does not factor in localized effects into their calculations, either. It is likely that the benefits will also be overestimated, since less people will be impacted by the package if some choose not to accept

certain aspects of it. This leads to the next weakness of the paper, which is the substantial amount of assumptions, previous literature, and software that the analysis relies on to make its claim. Though the Monte Carlo estimations lend a lot of credibility to the article, since they take into account many different underlying assumptions and allow the values that have been used to estimate the cost benefit analysis to differ, assumptions regarding the set up of the estimations can still be suspect. Furthermore, since much of the previous literature factors into each step of the analysis, it is possible that the assumptions of the cited literature accumulate with the assumptions of the article, thus skewing the data. The authors do admit for a few of the cited studies that the assumptions made do not reflect the assumptions that they would like to make in their study, so this causes an issue. Hypothetically, if the previous literature or software assumes that the number of people who accept the interventions is homogeneous across the country of Haiti while calculating the effects of a policy, and the authors use this information to calculate how the rest of the data can be rescaled to affect as much of the country as possible, then the final calculation will contain an implicit assumption that the interventions will be accepted uniformly across the country. For this reason, it is possible that the analysis contains many implicit assumptions from previous literature that the authors do not necessarily consider. It is possible that the simulations could have corrected for some of these assumptions, but the simulations themselves rest on enough assumptions from previous literature that there could be cause for doubt.

Despite its weaknesses, it appears that this article is both a necessary and well performed cost – benefit analysis of the package that it presents. While the authors do take much of the software and previous literature at its word, it nonetheless attempts to reconcile many of the assumptions it makes with the Monte Carlo simulations. Though not perfect, the analysis in question only attempts to consider an estimation of the benefits based on currently available information, and to estimate every single cost and benefit by themselves would take a lot of time, money, and other resources. For this reason, the article is successful as a cost – benefit analysis because it analyses the costs and benefits of

the package based on the most current data available. The best way to improve this analysis is to use GIS systems or to run survey data throughout Haiti to see if there are any localized areas that may not want certain types of help, whether this unwanted help is the education provided or one of the other interventions that the authors suggest. In this way, the data received can better reflect the culture, psychological, geographic, and other possible localized factors currently unaccounted for within this study.

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